REMARKS

The Application has been carefully reviewed in light of the Office Action dated March 31, 2004. Claims 1 to 13, 15 to 20, 22 and 25 to 30 are in the application, of which Claims 1, 13, 25, 26 and 30 are the independent claims. Claims 14, 21, 23 and 24 are being canceled without prejudice or disclaimer of the subject matter. Claims 1, 13, 25 and 26 are being amended, and Claims 28 to 30 are being added. Reconsideration and further examination are respectfully requested.

Applicants gratefully acknowledge the indication in the Office Action that Claims 4, 5, 16 and 17 recite allowable subject matter, and would be allowable if rewritten in independent form. Since it is believed that the claims from which these claims depend are also allowable over the applied art, Claims 4, 5, 16 and 17 have not been rewritten.

By the Office Action, Claims 1 to 3, 6 to 15 and 18 to 27 were rejected under 35 U.S.C. § 102(b) over U.S. Patent 5,767,876 (Koike). Without conceding the correctness of their rejection, Claims 14, 21, 23 and 24 are being cancelled Reconsideration and withdrawal of the grounds for rejection of the claims are respectfully requested, for the reasons set forth below.

The present invention generally concerns an ink-jet recording technique with which a high recording grade is achieved for both black images and color images. More specifically, ink-jet recording is performed using a plurality of recording heads and a plurality of recording scans performed in a given recording area. For each of the recording heads, a mask pattern is used to control formation of a recorded image, in a predetermined recording area, using black image data and color image data. The mask patterns identify for each scan a first allotment of a predetermined recording area in which the black image

data corresponding to the first allotment is formed and a second allotment of the predetermined recording in which the color image data corresponding to the second allotment is formed.

By virtue of this arrangement, the amount of black ink and color ink impacting a recording medium during each recording scan is controllable to lessen bleeding between the black and color inks and the frequency with which black ink and color ink simultaneously impact the recording medium can be reduced thereby reducing the possibility that the black and color inks will come into contact causing bleeding.

Turning to the specific language of the claims, Claim 1 defines a color ink-jet recording apparatus using a black recording head that ejects black ink on the basis of black image data and color recording heads that eject color ink on the basis of color image data, the color ink permeating through a recording medium at a higher speed than the black ink, the apparatus completing a record image in a predetermined recording area on the recording medium by causing the respective recording heads to perform a plurality of recording scans in the predetermined recording area. The apparatus comprises a data generating means, which, for each of the plurality of recording heads, uses mask patterns to form image data in each of the recording scans corresponding to the predetermined recording area. The mask patterns and the black and color image data are used to form the recorded image in the predetermined recording area by identifying for each scan a first allotment of the predetermined recording area in which the black image data corresponding to the first allotment is formed, and a second allotment of the predetermined area in which color image data corresponding to the second allotment is formed. Each of the mask patterns for the black image data and color image data used during the same recording scan

has different allotment rates.

The applied art, namely Koike, is not seen to disclose or to suggest each and every feature of the claims, at least with respect to using mask patterns and said black and color image data to form a recorded image in a predetermined recording area by identifying for each scan a first allotment of the predetermined recording area in which the black image data corresponding to the first allotment is formed, and a second allotment of the predetermined area in which color image data corresponding to the second allotment is formed. Each of the mask patterns for the black image data and color image data used during the same recording scan has different allotment rates.

Koike is seen to describe an ink jet recording technique in which a portion of the data that is to be printed using low-permeability black ink is converted to data which is printed using the high-permeability color inks. (See Koike, Abstract and col. 4, line 10 to col. 8, line 55) Koike is seen to describe using multiple scans for one band of a record medium to record the image using cyan, magenta, yellow and black inks.

Reference is made to Figures 5 and 37 to 51, and the description commencing at col. 23, line 21, of Koike. As Koike is seen to describe, Figure 37 is an example of a recorded image consisting of a single band which has a yellow area 27, a black area 22 and a cyan area 23. The yellow area 27 and the cyan area 23 are printed using the yellow and cyan high-permeability ink The black area 22 is printed using both low-permeability ink and high-permeability ink according to the pattern shown in Figure 5, which divides area 22 such that half is recorded using both high-permeability color inks (cyan, magenta and yellow inks) and a low-permeability black ink, and half is recorded using only low-permeability black ink. Referring again to Figure 37, area 22 consists of

color dots formed from cyan, magenta, yellow and black inks and the black dots are formed from black ink only. Figures 38 to 51 are seen to describe examples in which the cyan, magenta, yellow and black print heads are used in multiple scans over the same band to form areas 22, 23 and 28 of Figure 37.

The sequence of scans illustrated in Figures 38 to 42 is seen to involve the following scans of the band. In the state of the band shown in Figure 38, a first scan is used to record cyan in areas 22 and 23. In a second scan, to record black ink, nothing is recorded, even though there is black image data to be recorded in area 22. The paper is advanced so that the nozzles that eject magenta ink are in alignment with the band, and in Figure 39, magenta ink is recorded in area 22 over the cyan ink already recorded in area 22 of the band. The paper is then advanced to position the band with respect to the black nozzles, and the black ink is ejected in all of the blank positions in area 22, as shown in Figure 40. The paper is advanced again so that the nozzles that eject yellow ink are in alignment with the band, and yellow ink is ejected in area 27 and over the cyan and magenta inks in area 22, as shown in Figure 41. Finally, the band is positioned with respect to the black nozzles, and black ink is ejected over the colored-ink dots in area 22.

Figures 43 to 51 show different sequences of scans used for forming areas 22, 23 and 27. For example, in Figure 43, cyan is printed in areas 22 and 23 of the band, followed by both magenta and black in area 22 in Figure 44, and then followed by yellow in areas 27 and 22 and black in area 23 in Figure 46.

Thus, Kioke is seen to describe converting a black area 22, which would otherwise be printed using low-permeability ink to an area half of which is printed using both high-permeability and low-permeability inks and the other half of which is printed

using low-permeability ink.

Accordingly, Koike is not seen to disclose or to suggest using mask patterns and said black and color image data to form a recorded image in a predetermined recording area by identifying for each scan a first allotment of the predetermined recording area in which the black image data corresponding to the first allotment is formed, and a second allotment of the predetermined area in which color image data corresponding to the second allotment is formed. Each of the mask patterns for the black image data and color image data used during the same recording scan has different allotment rates.

Therefore, for at least the foregoing reasons, Claim 1 is believed to be in condition for allowance. Further, Applicants submit that Claims 13, 25, 26 and 32 are believed to be in condition for allowance for at least the same reasons.

The remaining claims are each dependent from the independent claims discussed above and are therefore believed patentable for the same reasons. Because each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner's earliest convenience.

Applicants' undersigned attorney may be reached in our Costa Mesa,

California office by telephone at (714) 540-8700. All correspondence should be directed to our address given below.

Respectfully submitted,

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